

July 3, 2012

RECEIVED

JUL 06 2012

Mr. Jason Gunter
Remedial Project Manager
U.S. Environmental Protection Agency
Region 7 - Superfund Branch
901 North 5th Street
Kansas City, KS 66101

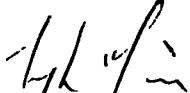
SUPERFUND DIVISION

Re: The Doe Run Company – Elvins/Rivermines Mine Tailings Site Monthly Progress Report

Dear Mr. Gunter:

As required by Article VI, Section 56 of the Unilateral Administrative Order (UAO) (CERCLA-07-2005-0169) for the referenced project and on behalf of The Doe Run Company, the progress report for the period May 1, 2012 through May 31, 2012 is enclosed. If you have any questions or comments, please call me at 573-638-5020 or Mark Nations at 573-518-0800.

Sincerely,



Ty L. Morris, P.E., R.G.
Vice President

TLM/jms
Enclosures
c: Mark Nations – TDRC
Matt Wohl – TDRC (electronic only)
Kathy Rangen – MDNR
Tim Skoglund – Barr Engineering

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Superfund

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Elvins/Rivermines Mine Tailings Site
Park Hills, Missouri
Removal Action - Monthly Progress Report
Period: May 1, 2012 – May 31, 2012

1. Actions Performed and Problems Encountered This Period:

- a. As has been previously discussed, clogging of the iron/sand media has been an issue with the pilot test. During the period, the bypass pipe that diverts flow around the ZVI/sand filter, aeration tank, and final sand filter remained active.
- b. Toward the end of the previous period, the roughing filter was observed to be overflowing due to a slow increase of head losses within the system while the bypass was active. The bypass pipe was flushed on May 3, 2012 and May 25, 2012. Black sediment was observed discharging from the pipe during flushing. A sample of this water and sediment discharging from the bypass pipe was obtained on May 25, 2012 and sent to the Doe Run analytical laboratory for testing.
- c. Efforts to evaluate possible renovations to the iron/sand filter and system piping continued.
- d. Planning for work on revamping the existing treatment ponds continued. This effort is based on the roughing filter and media mixture utilized in the pilot test. It is anticipated that this work will likely start sometime in July.
- e. Analytical sampling and field measurements continued two to three times a week for the duration of the month of May. No WET testing occurred in May.

2. Analytical Data and Results Received This Period:

- a. The removal percentage for dissolved zinc in the effluent coming from the bypass pipe was found to be consistently over 99.9%. This equated to dissolved zinc levels consistently below 10 µg/L.
- b. The removal percentage for total zinc in the effluent coming from the bypass pipe was found to range between 76.4% and 89.0% with the exception of the sample taken May 25, 2012 when the removal percentage was 26.7%. This equated to total zinc levels that ranged between 2.88 µg/L and 5.76 mg/L (the May 25, 2012 sample recorded a dissolved zinc level of 20.55 mg/l).
- c. Iron concentrations in the system effluent coming from the bypass pipe ranged between 0.74 mg/L to 2.14 mg/L. Iron concentrations in the system influent have been consistently near 0.0 mg/l.
- d. Total suspended solids concentrations in the system effluent were not tested during the period.
- e. A sample of the water and black sediment discharging from the bypass pipe as it was being flushed was taken on May 25, 2012. The analytical results of this sample showed a total zinc concentration of 40.5 mg/L, a total iron concentration of 3.7 mg/L, a total calcium concentration of 1.7 mg/L, a total sulfide concentration of 240 mg/L, a total suspended solids concentration of 126 mg/L, and a hardness of 6,013 mg/L.
- f. During this period, water samples were collected from just upstream of Old Missouri Highway 32, as well as from upstream and downstream of the confluence of the site discharge with Flat River. The analytical results for this event are included in this progress report.
- g. During this period, the Ambient Air Monitoring Report for February 2012 was received. Any issues identified in this report are discussed below. A copy of this document has been sent to your attention.

The February 2012 Ambient Air Monitoring Report noted the following:

- The action levels for lead and dust were not exceeded.

- No samples were taken with the Rivermines #1 (Office) TSP monitor on 02/28/12 due to mechanical failure. Upon discovery, the issue was corrected.
- There was a QA blank filter associated with the Rivermines #3 (Water Treatment Plant) TSP monitors and PM₁₀ on 02/29/12.

3. Developments Anticipated and Work Scheduled for Next Period:

- a. Continue analytical sampling and field measurements three times a week. No WET tests are planned at this time.
- b. Continue to operate the system with the bypass pipe.
- c. Complete monthly water sampling activities as described in the Removal Action Work Plan.
- d. Complete air monitoring activities as described in the Removal Action Work Plan.
- e. Complete renovations to the iron/sand filter and system piping. This will include the installation of additional plumbing to the system, as well as a coarse iron/pea gravel media for insertion into the square tank. After this has been completed, flow through all the system components will commence. Renovations are likely to occur in late June or early July.
- f. Planning for work on the full-scale treatment system will continue. This work is likely to begin in July.

4. Changes in Personnel:

- a. None.

5. Issues or Problems Arising This Period:

- a. None.

6. Resolution of Issues or Problems Arising This Period:

- a. None.

End of Monthly Progress Report

June 07, 2012

Allison Olds
Barr Engineering Company
1001 Diamond Ridge
Suite 1100
Jefferson City, MO 65109
TEL: (573) 638-5007
FAX: (573) 638-5001



RE: Rivermines MTS-25/86-0009

WorkOrder: 12060018

Dear Allison Olds:

TEKLAB, INC received 4 samples on 6/1/2012 11:00:00 AM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,



Michael L. Austin
Project Manager
(618)344-1004 ex 16
MAustin@teklabinc.com



Report Contents

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

This reporting package includes the following:

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Definitions

<http://www.teklabinc.com/>

Client: Barr Engineering Company
Client Project: Rivermines MTS-25/86-0009

Work Order: 12060018
Report Date: 07-Jun-12

Abbr Definition

- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
- DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
- DNI Did not ignite
- DUP Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
- IDPH IL Dept. of Public Health
- LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MB Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit
- NELAP NELAP Accredited
- PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
- RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
- RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
- SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
- Surrogate Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
- TNTC Too numerous to count (> 200 CFU)

Qualifiers

- | | |
|--|---|
| # - Unknown hydrocarbon | B - Analyte detected in associated Method Blank |
| E - Value above quantitation range | H - Holding times exceeded |
| M - Manual Integration used to determine area response | ND - Not Detected at the Reporting Limit |
| R - RPD outside accepted recovery limits | S - Spike Recovery outside recovery limits |
| X - Value exceeds Maximum Contaminant Level | |



Case Narrative

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Client Project: Rivermines MTS-25/86-0009

Work Order: 12060018

Report Date: 07-Jun-12

Cooler Receipt Temp: 0.6 °C

Locations and Accreditations

Collinsville		Springfield		Kansas City	
Address	5445 Horseshoe Lake Road Collinsville, IL 62234-7425	Address	3920 Pintail Dr Springfield, IL 62711-9415	Address	8421 Nieman Road Lenexa, KS 66214
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998
Email	jhriley@teklabinc.com	Email	kmcclain@teklabinc.com	Email	dthompson@teklabinc.com

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2013	Collinsville
Kansas	KDHE	E-10374	NELAP	1/31/2013	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2012	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2012	Springfield
Arkansas	ADEQ	88-0966		3/14/2013	Collinsville
Illinois	IDPH	17584		4/30/2013	Collinsville
Kentucky	UST	0073		5/26/2014	Collinsville
Missouri	MDNR	00930		4/13/2013	Collinsville
Oklahoma	ODEQ	9978		8/31/2012	Collinsville



Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

Lab ID: 12060018-001

Client Sample ID: RM-001

Matrix: AQUEOUS

Collection Date: 05/31/2012 7:45

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	1000		1010	mg/L	100	06/05/2012 13:34	R164431
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		7.56		1	06/01/2012 12:29	R164284
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO ₃)	NELAP	5		1260	mg/L	1	06/01/2012 12:20	R164298
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		< 6	mg/L	1	06/01/2012 13:06	R164280
STANDARD METHODS 18TH ED. 2540 F								
Solids, Settleable	NELAP	0.1		< 0.1	ml/L	1	06/01/2012 12:11	R164275
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		1.0	mg/L	1	06/04/2012 20:45	R164375
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		10.1	µg/L	1	06/05/2012 7:55	78596
Zinc	NELAP	10.0		11000	µg/L	1	06/05/2012 7:55	78596
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		12.9	µg/L	1	06/05/2012 3:08	78614
Zinc	NELAP	10.0		11300	µg/L	1	06/05/2012 3:08	78614
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00	X	10.5	µg/L	1	06/01/2012 13:51	78595
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	2.00	X	11.7	µg/L	1	06/04/2012 10:46	78613



Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

Lab ID: 12060018-002

Client Sample ID: RM-Dup

Matrix: AQUEOUS

Collection Date: 05/31/2012 8:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	200		530	mg/L	20	06/06/2012 15:33	R164443
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		7.79		1	06/01/2012 12:31	R164284
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO ₃)	NELAP	5		820	mg/L	1	06/01/2012 12:20	R164298
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		8	mg/L	1	06/01/2012 13:06	R164280
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		2.5	mg/L	1	06/04/2012 20:52	R164375
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	06/05/2012 8:01	78596
Zinc	NELAP	10.0		251	µg/L	1	06/05/2012 8:01	78596
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	06/05/2012 3:13	78614
Zinc	NELAP	10.0		662	µg/L	1	06/05/2012 3:13	78614
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00		< 2.00	µg/L	1	06/01/2012 15:40	78595
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	2.00	X	11.4	µg/L	1	06/04/2012 11:03	78613



Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

Lab ID: 12060018-003

Client Sample ID: RM-DS

Matrix: AQUEOUS

Collection Date: 05/31/2012 8:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	200		533	mg/L	20	06/06/2012 15:35	R164443
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		7.76		1	06/01/2012 12:32	R164284
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO ₃)	NELAP	5		840	mg/L	1	06/01/2012 12:20	R164298
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		< 6	mg/L	1	06/01/2012 13:06	R164280
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		2.3	mg/L	1	06/04/2012 20:58	R164375
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	06/05/2012 8:19	78596
Zinc	NELAP	10.0		264	µg/L	1	06/05/2012 8:19	78596
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	06/05/2012 3:31	78614
Zinc	NELAP	10.0		653	µg/L	1	06/05/2012 3:31	78614
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00		< 2.00	µg/L	1	06/01/2012 15:43	78595
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	2.00	X	10.0	µg/L	1	06/04/2012 11:07	78613



Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

Lab ID: 12060018-004

Client Sample ID: RM-US

Matrix: AQUEOUS

Collection Date: 05/31/2012 7:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	10		28	mg/L	1	06/05/2012 16:57	R164431
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		7.49		1	06/01/2012 12:34	R164284
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO ₃)	NELAP	5		280	mg/L	1	06/01/2012 12:20	R164298
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		< 6	mg/L	1	06/01/2012 13:06	R164280
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		2.8	mg/L	1	06/04/2012 21:05	R164375
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	06/05/2012 8:25	78596
Zinc	NELAP	10.0		< 10.0	µg/L	1	06/05/2012 8:25	78596
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	06/05/2012 3:37	78614
Zinc	NELAP	10.0		< 10.0	µg/L	1	06/05/2012 3:37	78614
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00		< 2.00	µg/L	1	06/01/2012 15:47	78595
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	2.00		2.12	µg/L	1	06/04/2012 11:10	78613



Sample Summary

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Client Project: Rivermines MTS-25/86-0009

Work Order: 12060018

Report Date: 07-Jun-12

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
12060018-001	RM-001	Aqueous	5	05/31/2012 7:45
12060018-002	RM-Dup	Aqueous	5	05/31/2012 8:30
12060018-003	RM-DS	Aqueous	5	05/31/2012 8:20
12060018-004	RM-US	Aqueous	5	05/31/2012 7:25



Dates Report

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

Sample ID	Client Sample ID	Collection Date	Received Date	
	Test Name		Prep Date/Time	Analysis Date/Time
12060018-001A	RM-001	05/31/2012 7:45	6/1/2012 11:00:00 AM	
	Standard Methods 18th Ed. 2540 F			06/01/2012 12:11
12060018-001B	RM-001	05/31/2012 7:45	6/1/2012 11:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			06/05/2012 13:34
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			06/01/2012 12:29
	Standard Methods 18th Ed. 2340 C			06/01/2012 12:20
	Standard Methods 18th Ed. 2540 D			06/01/2012 13:06
12060018-001C	RM-001	05/31/2012 7:45	6/1/2012 11:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)			06/01/2012 17:19
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA			06/01/2012 16:48
12060018-001D	RM-001	05/31/2012 7:45	6/1/2012 11:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)			06/01/2012 12:45
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)			06/01/2012 12:11
12060018-001E	RM-001	05/31/2012 7:45	6/1/2012 11:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			06/04/2012 20:45
12060018-002A	RM-Dup	05/31/2012 8:30	6/1/2012 11:00:00 AM	
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			06/01/2012 12:31
	Standard Methods 18th Ed. 2540 D			06/01/2012 13:06
12060018-002B	RM-Dup	05/31/2012 8:30	6/1/2012 11:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			06/06/2012 15:33
	Standard Methods 18th Ed. 2340 C			06/01/2012 12:20
12060018-002C	RM-Dup	05/31/2012 8:30	6/1/2012 11:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)			06/01/2012 17:19
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA			06/01/2012 16:56
12060018-002D	RM-Dup	05/31/2012 8:30	6/1/2012 11:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)			06/01/2012 12:45
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)			06/01/2012 12:11
12060018-002E	RM-Dup	05/31/2012 8:30	6/1/2012 11:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			06/04/2012 20:52
12060018-003A	RM-DS	05/31/2012 8:20	6/1/2012 11:00:00 AM	
	Standard Methods 18th Ed. 2540 F			06/01/2012 12:11
12060018-003B	RM-DS	05/31/2012 8:20	6/1/2012 11:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			06/06/2012 15:35
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			06/01/2012 12:32
	Standard Methods 18th Ed. 2340 C			06/01/2012 12:20
	Standard Methods 18th Ed. 2540 D			06/01/2012 13:06



Dates Report

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Client Project: Rivermines MTS-25/86-0009

Work Order: 12060018

Report Date: 07-Jun-12

Sample ID	Client Sample ID	Collection Date	Received Date	
			Prep Date/Time	Analysis Date/Time
12060018-003C	RM-DS	05/31/2012 8:20	6/1/2012 11:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		06/01/2012 17:19	06/05/2012 3:31
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		06/01/2012 16:56	06/04/2012 11:07
12060018-003D	RM-DS	05/31/2012 8:20	6/1/2012 11:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		06/01/2012 12:45	06/05/2012 8:19
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		06/01/2012 12:11	06/01/2012 15:43
12060018-003E	RM-DS	05/31/2012 8:20	6/1/2012 11:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			06/04/2012 20:58
12060018-004A	RM-US	05/31/2012 7:25	6/1/2012 11:00:00 AM	
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			06/01/2012 12:34
	Standard Methods 18th Ed. 2540 D			06/01/2012 13:06
12060018-004B	RM-US	05/31/2012 7:25	6/1/2012 11:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			06/05/2012 16:57
	Standard Methods 18th Ed. 2340 C			06/01/2012 12:20
12060018-004C	RM-US	05/31/2012 7:25	6/1/2012 11:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		06/01/2012 17:19	06/05/2012 3:37
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		06/01/2012 16:56	06/04/2012 11:10
12060018-004D	RM-US	05/31/2012 7:25	6/1/2012 11:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		06/01/2012 12:45	06/05/2012 8:25
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		06/01/2012 12:11	06/01/2012 15:47
12060018-004E	RM-US	05/31/2012 7:25	6/1/2012 11:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			06/04/2012 21:05



Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

EPA 600 375.2 REV 2.0 1993 (TOTAL)

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		< 10						06/05/2012
Batch R164431 SampType: LCS		Units mg/L							
SampID: ICB/LCS									
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		20	20	0	99.8	90	110	06/05/2012
Batch R164431 SampType: MS		Units mg/L							
SampID: 12060018-004BMS									
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		38	10	28.14	96.4	85	115	06/05/2012
Batch R164431 SampType: MSD		Units mg/L					RPD Limit 10		
SampID: 12060018-004BMSD									
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate	10		38	10	28.14	95.1	37.78	0.34	06/05/2012
Batch R164443 SampType: MBLK		Units mg/L							
SampID: CCB									
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		< 10						06/07/2012
Batch R164443 SampType: MBLK		Units mg/L							
SampID: ICB/MBLK									
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		< 10						06/06/2012
Batch R164443 SampType: LCS		Units mg/L							
SampID: CCV									
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		20	20	0	99.6	90	110	06/07/2012
Batch R164443 SampType: LCS		Units mg/L							
SampID: ICV/LCS									
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		21	20	0	103.2	90	110	06/06/2012



Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED

Batch	R164284	SampType:	LCS	Units								
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lab pH				1.00		6.99	7.00	0	99.9	99.1	100.8	06/01/2012

Batch	R164284	SampType:	DUP	Units							RPD Limit 10	
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH				1.00		7.55				7.560	0.13	06/01/2012

Batch	R164284	SampType:	DUP	Units							RPD Limit 10	
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH				1.00		7.78				7.790	0.13	06/01/2012

Batch	R164284	SampType:	DUP	Units							RPD Limit 10	
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH				1.00		7.78				7.760	0.26	06/01/2012

Batch	R164284	SampType:	DUP	Units							RPD Limit 10	
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH				1.00		7.47				7.490	0.27	06/01/2012

STANDARD METHODS 18TH ED. 2340 C												
Batch	R164298	SampType:	MBLK	Units mg/L								
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hardness, as (CaCO ₃)				5		< 5						06/01/2012

Batch	R164298	SampType:	LCS	Units mg/L								
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hardness, as (CaCO ₃)				5		1020	1000	0	102.0	90	110	06/01/2012

Batch	R164298	SampType:	MS	Units mg/L								
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hardness, as (CaCO ₃)				5		660	400	280.0	95.0	85	115	06/01/2012



Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

STANDARD METHODS 18TH ED. 2340 C

Batch R164298	SampType: MSD	Units mg/L	RPD Limit 10				Date Analyzed			
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Hardness, as (CaCO ₃)		5		720	400	280.0	110.0	660.0	8.70	06/01/2012

STANDARD METHODS 18TH ED. 2540 D

Batch R164280	SampType: MBLK	Units mg/L	Low Limit				High Limit	Date Analyzed		
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Suspended Solids		6.00		< 6.00						06/01/2012
Total Suspended Solids		6		< 6						06/01/2012

Batch R164280 SampType: LCS Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Suspended Solids	6		102	100	0	102.0	85	115	06/01/2012
Total Suspended Solids	6		96	100	0	96.0	85	115	06/01/2012
Total Suspended Solids	6		104	100	0	104.0	85	115	06/01/2012
Total Suspended Solids	6		91	100	0	91.0	85	115	06/01/2012

Batch R164280 SampType: DUP Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Suspended Solids	6		< 6				0	0.00	06/01/2012

STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON

Batch R164375	SampType: MBLK	Units mg/L	Low Limit				High Limit	Date Analyzed		
Analyses		RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)		1.0		< 1.0						06/04/2012

Batch R164375 SampType: LCS Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)	5.0		47.2	48.2	0	98.0	89.6	109.5	06/04/2012

Batch R164375 SampType: MS Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)	1.0		8.1	5.0	2.780	106.4	80	120	06/04/2012

Batch R164375 SampType: MSD Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)	1.0		7.5	5.0	2.780	95.0	8.100	7.29	06/04/2012

Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)

Batch 78596 SampType: MBLK Units µg/L

SampID: MB-78596

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		< 2.00	2.00	0	0	-100	100	06/01/2012
Zinc	10.0		< 10.0	10.0	0	0	-100	100	06/01/2012

Batch 78596 SampType: LCS Units µg/L

SampID: LCS-78596

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		46.3	50.0	0	92.6	85	115	06/01/2012
Zinc	10.0		487	500	0	97.4	85	115	06/01/2012

Batch 78596 SampType: MS Units µg/L

SampID: 12060018-002DMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		44.1	50.0	0	88.2	75	125	06/05/2012
Zinc	10.0		706	500	250.8	91.0	75	125	06/05/2012

Batch 78596 SampType: MSD Units µg/L

SampID: 12060018-002DMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cadmium	2.00		44.4	50.0	0	88.8	44.1	0.68	06/05/2012
Zinc	10.0		709	500	250.8	91.6	705.7	0.47	06/05/2012

EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)

Batch 78614 SampType: MBLK Units µg/L

SampID: MB-78614

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		< 2.00	2.00	0	0	-100	100	06/04/2012
Zinc	10.0		< 10.0	10.0	0	0	-100	100	06/04/2012

Batch 78614 SampType: LCS Units µg/L

SampID: LCS-78614

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		49.7	50.0	0	99.4	85	115	06/04/2012
Zinc	10.0		511	500	0	102.2	85	115	06/04/2012

Batch 78614 SampType: MS Units µg/L

SampID: 12060018-002CMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		47.3	50.0	1	92.6	75	125	06/05/2012
Zinc	10.0		1150	500	661.6	98.5	75	125	06/05/2012



Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company
Client Project: Rivermines MTS-25/86-0009

Work Order: 12060018
Report Date: 07-Jun-12

EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cadmium	2.00		46.0	50.0	1	90.0	47.3	2.79	06/05/2012
Zinc	10.0		1120	500	661.6	92.1	1154	2.81	06/05/2012

STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		< 2.00	2.00	0	0	-100	100	06/01/2012

Batch 78595 SampType: LCS Units µg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		14.4	15.0	0	96.1	85	115	06/01/2012

Batch 78595 SampType: MS Units µg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	4.00		22.7	15.0	10.5476	80.8	70	130	06/01/2012

Batch 78595 SampType: MSD Units µg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lead	4.00		22.7	15.0	10.5476	81.1	22.6607	0.25	06/01/2012

STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA

Batch 78613 SampType: MBLK Units µg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		< 2.00	2.00	0	0	-100	100	06/04/2012

Batch 78613 SampType: LCS Units µg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		17.0	15.0	0	113.4	85	115	06/04/2012

Batch 78613 SampType: MS Units µg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		25.6	15.0	11.727	92.2	70	130	06/04/2012



Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA

Batch	SampType	Units	RPD Limit	Date						
78613	MSD	µg/L	20							
Analyses	RL	Qual	Result	Spike	SPK	Ref Val	%REC	RPD Ref Val	%RPD	Analyzed
Lead	2.00		24.9	15.0	11.727	87.9		25.5531	2.57	06/04/2012



Receiving Check List

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12060018

Client Project: Rivermines MTS-25/86-0009

Report Date: 07-Jun-12

Carrier: Ricky Schmidt

Received By: JMH

Completed by:

On:

01-Jun-12


Timothy W. Mathis

Reviewed by:

On:

01-Jun-12


Michael L. Austin

Pages to follow: Chain of custody

Extra pages included

Shipping container/coolier in good condition?

Yes No Not Present Temp °C 0.6

Type of thermal preservation?

None Ice Blue Ice Dry Ice

Chain of custody present?

Yes No

Chain of custody signed when relinquished and received?

Yes No

Chain of custody agrees with sample labels?

Yes No

Samples in proper container/bottle?

Yes No

Sample containers intact?

Yes No

Sufficient sample volume for indicated test?

Yes No

All samples received within holding time?

Yes No

Reported field parameters measured:

Field Lab

NA

Container/Temp Blank temperature in compliance?

Yes No

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water - at least one vial per sample has zero headspace?

Yes No No VOA vials

Water - TOX containers have zero headspace?

Yes No No TOX containers

Water - pH acceptable upon receipt?

Yes No

Any No responses must be detailed below or on the COC.

Custody seal(s) intact on shipping container/coolier.

Print Form

Teklab Chain of Custody

Pg. 1 of 1

Workorder 12060018

5445 Horseshoe Lake Road ~ Collinsville, IL 62234 ~ Phone: (618)344-1004 ~ Fax:(618)344-1005

Barr Engineering Co.

Are the samples chilled? Yes No with: Ice Blue ice

Preserved in

Lab Field

KL 6/1/12

1001 Diamond Ridge, Suite 1100

Cooler Temp 0.6 Sampler Chris Schulte

Jefferson City

MO

65109

Comments

Invoice to Mark Nations. Results to Allison Olds and Mark Nations, mnations@doerun.com
Matrix is surface water.

Metals = Cd, Pb, Zn

Custody seal intact 26 6-1-12

Contact Allison Olds

eMail aolds@barr.com

Phone 573-638-5007

Requested Due Date Standard

Billing/PO Per contract with Doe Run

Lab Use	Sample ID	Sample Date/Time	Preservative Matrix	5	15	Sulfate	Settable Solids	T.O.C.	Total Metals	Dissolved Metals	Hardness					
12060018 001	RM-001	5/31/12 / 7:45	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
002	RM-Dup	5/31/12 / 8:20	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
003	RM-DS	5/31/12 / 8:20	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
004	RM-US	5/31/12 / 7:25	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
			Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
			Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
			Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						

Relinquished By*	Date/Time	Received By	Date/Time
<i>R. Schmidt</i>	5/31/12 / 16:00	<i>R. Schmidt</i>	6/1/12 08:30
<i>R. Schmidt</i>	6/1/12 / 11:00	<i>J. Schulte</i>	6/1/12 11:00

* The individual signing this agreement on behalf of client acknowledges that they have read and understand the terms of this agreement and that they have the authority to sign on behalf of client.

Teklab Inc.
Courier Pick Up

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/2/12	12-2825	RM SEEP T	79	24480^	5.7	28	841	3.1	0.90	199	1326	6.9
5/2/12	12-2825	RM SEEP D		22950^					0.32			
5/2/12	12-2826	RMP ROUGH T	4.7	5760^	ND	ND	291	0.94 J	2141^	224	1237	6.79
5/2/12	12-2826	RMP ROUGH D		4.6					1348^			

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2825, L12-0001-2826

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.03	0.38	5/11/12	
Copper	ug/L	ND	0.97	5/11/12	
Lead	ug/L	1.3	2.7	5/11/12	
Zinc	ug/L	0.31	0.91	5/11/12	
Nickel	ug/L	0.14	0.86	5/11/12	
Thallium	ug/L	0.28	1.86	5/11/12	
Iron	ug/L	ND	NA	5/11/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2825, L12-0001-2826

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	0.02	0.91	5/7/12	
Iron	ug/L	1.6	NA	5/7/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	609	122%	85-125%	
Copper	ug/L	500	594	119%	85-125%	
Lead	ug/L	500	603	121%	85-125%	
Zinc	ug/L	500	610	122%	85-125%	
Nickel	ug/L	500	607	121%	85-125%	
Iron	ug/L	500	601	120%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	514	103%	85-125%	
Iron	ug/L	500	532	106%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2826 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	556	554	111%	111%	75-125%	
Copper	ug/L	1.1	500	500	542	552	108%	110%	75-125%	
Lead	ug/L	6.9	500	500	551	549	109%	108%	75-125%	
Zinc	ug/L	58	500	500	613	612	111%	111%	75-125%	
Nickel	ug/L	3.3	500	500	558	555	111%	110%	75-125%	
Iron	ug/L	21	500	500	568	562	109%	108%	75-125%	



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2825, L12-0001-2826

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	2.03	5	5/2/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	101.4	101%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	101.4	101%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-2825

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	199	212	107%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.93	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0079
Slope	98.5%	90-102%	



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-2825, L12-0001-2826

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/29/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec Limits	Qual
Sulfate 12-2826	mg/l	12.4	5	18.5	122%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5	5.5	110%	85-115	



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(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/14/2012
Manager	Date
EJS	5/14/2012

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SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/4/12	12-2868	RM SEEP T	83	31730^	8.6	28	837	1.4	2.5	195	1313	7.03
5/4/12	12-2868	RM SEEP D		21950^					8.3***			
5/4/12	12-2869	RMP ROUGH T	4.6	4127^	ND	ND	256	1.5	1285^	211	1221	6.98
5/4/12	12-2869	RMP ROUGH D		4.0					1610****			

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2868, L12-0001-2869

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.08	0.38	5/11/12	
Copper	ug/L	ND	0.97	5/11/12	
Lead	ug/L	ND	2.7	5/11/12	
Zinc	ug/L	0.17	0.91	5/11/12	
Nickel	ug/L	ND	0.86	5/11/12	
Thallium	ug/L	0.79	1.86	5/11/12	
Iron	ug/L	ND	NA	5/11/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2868, L12-0001-2869

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	0.03	0.91	5/7/12	
Iron	ug/L	5.2	NA	5/7/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	562	112%	85-125%	
Copper	ug/L	500	560	112%	85-125%	
Lead	ug/L	500	555	111%	85-125%	
Zinc	ug/L	500	565	113%	85-125%	
Nickel	ug/L	500	557	111%	85-125%	
Iron	ug/L	500	556	111%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	562	112%	85-125%	
Iron	ug/L	500	574	115%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2869 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	580	590	116%	118%	75-125%	
Copper	ug/L	0	500	500	577	592	115%	118%	75-125%	
Lead	ug/L	0.55	500	500	572	582	114%	116%	75-125%	
Zinc	ug/L	41	500	500	619	631	116%	118%	75-125%	
Nickel	ug/L	3.2	500	500	577	586	115%	117%	75-125%	
Iron	ug/L	13	500	500	583	595	114%	116%	75-125%	



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Viburnum, MO 65566
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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2868, L12-0001-2869

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.93	5	5/9/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	99.7	100%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	97.8	98%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-2868

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	195.4	197.4	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.98	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	9.98	9.96-10.06	L11-0002-0122
Slope	98.6%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAF 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-2868, L12-0001-2869

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/29/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec	Qual
Sulfate 12-2869	mg/l	12.2	6	18.8	110%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5	5.4	108%	85-115		



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QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	TLL

Report Acceptance	
QAO	Date
GWP	5/14/2012
Manager	Date
EJS	5/14/2012

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SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/7/12	12-2935	RM SEEP T	75	29510^	12	30	828	2.5	ND	188	1356	6.9
5/7/12	12-2935	RM SEEP D		31960^***					0.37			
5/7/12	12-2936	RMP ROUGH T	4.4	4759^	ND	ND	251	ND	1007	213	1212	6.82
5/7/12	12-2936	RMP ROUGH D		7.4					1253^***			

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
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(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2935, L12-0001-2936

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.02	0.38	5/14/12	
Copper	ug/L	ND	0.97	5/14/12	
Lead	ug/L	ND	2.7	5/14/12	
Zinc	ug/L	ND	0.91	5/14/12	
Nickel	ug/L	ND	0.86	5/14/12	
Thallium	ug/L	ND	1.86	5/14/12	
Iron	ug/L	ND	NA	5/14/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2935, L12-0001-2936

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/10/12	
Iron	ug/L	5.1	NA	5/10/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	503	101%	85-125%	
Copper	ug/L	500	510	102%	85-125%	
Lead	ug/L	500	506	101%	85-125%	
Zinc	ug/L	500	510	102%	85-125%	
Nickel	ug/L	500	497	99%	85-125%	
Iron	ug/L	500	510	102%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	509	102%	85-125%	
Iron	ug/L	500	474	95%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2936 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	535	535	107%	107%	75-125%	
Copper	ug/L	0	500	500	498	502	100%	100%	75-125%	
Lead	ug/L	0	500	500	504	502	101%	100%	75-125%	
Zinc	ug/L	48	500	500	605	601	111%	111%	75-125%	
Nickel	ug/L	3.3	500	500	496	495	99%	98%	75-125%	
Iron	ug/L	4.6	500	500	503	502	100%	99%	75-125%	



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QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2935, L12-0001-2936

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.93	5	5/9/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	99.7	100%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	97.7	98%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-2935

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	187.5	190.5	102%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.98	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	9.98	9.96-10.06	L11-0002-0122
Slope	98.6%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAF 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-2935, L12-0001-2936

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/29/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec	Qual
Sulfate 12-2936	mg/l	12.1	5	18	118%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5	5.5	110%	85-115		



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/15/2012
Manager	Date
EJS	5/15/2012

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/9/12	12-2997	RM SEEP T	73	27220^	7.3	26	763	1.4	ND	205	1211	6.93
5/9/12	12-2997	RM SEEP D		29920****					ND			
5/9/12	12-2998	RMP ROUGH T	4.7	5125^	ND	ND	259	ND	1021	207	1240	6.81
5/9/12	12-2998	RMP ROUGH D		6.6					1116****			

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
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SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2997, L12-0001-2998

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.02	0.38	5/14/12	
Copper	ug/L	ND	0.97	5/14/12	
Lead	ug/L	ND	2.7	5/14/12	
Zinc	ug/L	ND	0.91	5/14/12	
Nickel	ug/L	ND	0.86	5/14/12	
Thallium	ug/L	0.06	1.86	5/14/12	
Iron	ug/L	ND	NA	5/14/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2997, L12-0001-2998

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	0.12	0.91	5/10/12	
Iron	ug/L	1	NA	5/10/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	496	99%	85-125%	
Copper	ug/L	500	509	102%	85-125%	
Lead	ug/L	500	498	100%	85-125%	
Zinc	ug/L	500	499	100%	85-125%	
Nickel	ug/L	500	490	98%	85-125%	
Iron	ug/L	500	500	100%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	521	104%	85-125%	
Iron	ug/L	500	483	97%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2998 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	522	534	104%	107%	75-125%	
Copper	ug/L	0.03	500	500	513	522	103%	104%	75-125%	
Lead	ug/L	0	500	500	494	504	99%	101%	75-125%	
Zinc	ug/L	51	500	500	593	608	108%	111%	75-125%	
Nickel	ug/L	3.1	500	500	487	499	97%	99%	75-125%	
Iron	ug/L	6.3	500	500	468	486	92%	96%	75-125%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2997, L12-0001-2998

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.93	5	5/9/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	99.7	100%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	97.7	98%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-2997

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	205.3	201.3	98%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.98	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	9.98	9.96-10.06	L11-0002-0122
Slope	98.6%	90-102%	



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
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(573) 244-8105

QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-2997, L12-0001-2998

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/25/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec Limits	Qual
Sulfate 12-2998	mg/l	12.4	5	18.5	122%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5	5.4	108%	75-125	



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43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
A	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/15/2012
Manager	Date
EJS	5/15/2012

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
5/11/12	12-3048	RM SEEP T	65	43140^	6.1	29	692	2.0	5.0	177	7.22
5/11/12	12-3048	RM SEEP D		46580^***					4.1		
5/11/12	12-3049	RMP ROUGH T	72	4913^	ND	ND	264	ND	1012	212	7.24
5/11/12	12-3049	RMP ROUGH D		5.0					2022^***		

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3048, L12-0001-3049

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.09	0.38	5/14/12	
Copper	ug/L	ND	0.97	5/14/12	
Lead	ug/L	0.18	2.7	5/14/12	
Zinc	ug/L	ND	0.91	5/14/12	
Nickel	ug/L	ND	0.86	5/14/12	
Thallium	ug/L	ND	1.86	5/14/12	
Iron	ug/L	ND	NA	5/14/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3048, L12-0001-3049

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/11/12	
Iron	ug/L	ND	NA	5/11/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	501	100%	85-125%	
Copper	ug/L	500	498	100%	85-125%	
Lead	ug/L	500	513	103%	85-125%	
Zinc	ug/L	500	500	100%	85-125%	
Nickel	ug/L	500	510	102%	85-125%	
Iron	ug/L	500	494	99%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	502	100%	85-125%	
Iron	ug/L	500	522	104%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3049 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	554	559	111%	112%	75-125%	
Copper	ug/L	0	500	500	529	533	106%	107%	75-125%	
Lead	ug/L	1.4	500	500	526	531	105%	106%	75-125%	
Zinc	ug/L	49	500	500	633	637	117%	118%	75-125%	
Nickel	ug/L	3.1	500	500	518	522	103%	104%	75-125%	
Iron	ug/L	10	500	500	498	513	98%	101%	75-125%	



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3048, L12-0001-3049

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.91	5	5/16/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	98.3	98%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	99.3	99%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3048

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	176.6	178.6	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.91	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	3.96	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.88	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0122
Slope	99.2%	90-102%	



Quentin J. Schmidt Analytical Laboratory
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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3048, L12-0001-3049

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/17/2012
Manager	Date
EJS	5/17/2012

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SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/14/12	12-3135	RM SEEP T	66	25230^	5.9	28	679	ND	5.1	179	1298	7.08
5/14/12	12-3135	RM SEEP D		26640^***					ND			
5/14/12	12-3136	RMP ROUGH T	4.8	4890^	ND	ND	257	ND	942	225	1216	7.06
5/14/12	12-3136	RMP ROUGH D		7.8					892			

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	5/16/12	
Copper	ug/L	ND	0.97	5/16/12	
Lead	ug/L	ND	2.7	5/16/12	
Zinc	ug/L	ND	0.91	5/16/12	
Nickel	ug/L	0.08	0.86	5/16/12	
Thallium	ug/L	ND	1.86	5/16/12	
Iron	ug/L	0.70	2.0	5/16/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/15/12	
Iron	ug/L	ND	2.0	5/15/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	519	104%	85-125%	
Copper	ug/L	500	517	103%	85-125%	
Lead	ug/L	500	528	106%	85-125%	
Zinc	ug/L	500	526	105%	85-125%	
Nickel	ug/L	500	517	103%	85-125%	
Iron	ug/L	500	507	101%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	522	104%	85-125%	
Iron	ug/L	500	504	101%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3136 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	563	567	113%	113%	75-125%	
Copper	ug/L	0	500	500	530	532	106%	106%	75-125%	
Lead	ug/L	0	500	500	534	536	107%	107%	75-125%	
Zinc	ug/L	49	500	500	641	645	118%	119%	75-125%	
Nickel	ug/L	3.3	500	500	525	528	104%	105%	75-125%	
Iron	ug/L	8.8	500	500	513	522	101%	103%	75-125%	



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QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.91	5	5/16/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	98.3	98%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	99.3	99%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3135

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	178.3	178.6	100%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.91	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	3.96	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.88	9.96-10.06	L11-0002-0103
CCV Buffer 10.00	9.99	9.96-10.06	L11-0002-0122
Slope	99.2%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/25/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec	Qual
Sulfate 12-3136	mg/l	12.2	5	18.4	124%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5	5.4	108%	85-115		



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(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/17/2012
Manager	Date
EJS	5/17/2012

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
5/16/12	12-3231	RM SEEP T	63	25600^	4.7	27	672	ND	1.9 J	179	6.98
5/16/12	12-3231	RM SEEP D		26330^***					3.6 ***		
5/16/12	12-3232	RMP ROUGH T	4.7	4730^	ND	ND	239	ND	903	225	6.89
5/16/12	12-3232	RMP ROUGH D		9.2					826		

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3231, L12-0001-3232

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.04	0.38	5/17/12	
Copper	ug/L	0.02	0.97	5/17/12	
Lead	ug/L	ND	2.7	5/17/12	
Zinc	ug/L	ND	0.91	5/17/12	
Nickel	ug/L	ND	0.86	5/17/12	
Thallium	ug/L	ND	1.86	5/17/12	
Iron	ug/L	0.08	2.0	5/17/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/17/12	
Iron	ug/L	2.4	2.0	5/17/12	M

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	469	94%	85-125%	
Copper	ug/L	500	503	101%	85-125%	
Lead	ug/L	500	474	95%	85-125%	
Zinc	ug/L	500	472	94%	85-125%	
Nickel	ug/L	500	470	94%	85-125%	
Iron	ug/L	500	510	102%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	498	100%	85-125%	
Iron	ug/L	500	483	97%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3232 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0.03	500	500	525	524	105%	105%	75-125%	
Copper	ug/L	0	500	500	531	520	106%	104%	75-125%	
Lead	ug/L	11	500	500	494	493	97%	96%	75-125%	
Zinc	ug/L	47	500	500	593	594	109%	109%	75-125%	
Nickel	ug/L	2.7	500	500	491	491	98%	98%	75-125%	
Iron	ug/L	11	500	500	489	509	96%	100%	75-125%	



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QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3231, L12-0001-3232

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.59	5	5/18/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	97.2	97%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	98.1	98%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3231

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	179	182	102%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.03	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.10	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.96	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	9.98	9.96-10.06	L11-0002-0122
Slope	97.9%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



QUALIFIERS

Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.

NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/21/2012
Manager	Date
EJS	5/21/2012

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/18/12	12-3275	RM SEEP T	65	25600^	8.5	27	693	ND	1.9	184	1286	7.03
5/18/12	12-3275	RM SEEP D		29510****					5.7***			
5/18/12	12-3276	RMP ROUGH T	4.0	3968^	2.3	ND	210	ND	856	235	1194	6.98
5/18/12	12-3276	RMP ROUGH D		7.8					838			

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3275, L12-0001-3276

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.04	0.38	5/18/12	
Copper	ug/L	1.1	0.97	5/18/12	M
Lead	ug/L	ND	2.7	5/18/12	
Zinc	ug/L	ND	0.91	5/18/12	
Nickel	ug/L	ND	0.86	5/18/12	
Thallium	ug/L	0.36	1.86	5/18/12	
Iron	ug/L	1.2	2.0	5/18/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/18/12	
Iron	ug/L	2.8	2.0	5/18/12	M

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	448	90%	85-125%	
Copper	ug/L	500	478	96%	85-125%	
Lead	ug/L	500	458	92%	85-125%	
Zinc	ug/L	500	454	91%	85-125%	
Nickel	ug/L	500	443	89%	85-125%	
Iron	ug/L	500	465	93%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	551	110%	85-125%	
Iron	ug/L	500	497	99%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3276 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	515	504	103%	101%	75-125%	
Copper	ug/L	0.43	500	500	499	487	100%	97%	75-125%	
Lead	ug/L	1	500	500	486	475	97%	95%	75-125%	
Zinc	ug/L	40	500	500	580	570	108%	106%	75-125%	
Nickel	ug/L	2.3	500	500	473	463	94%	92%	75-125%	
Iron	ug/L	7.9	500	500	446	457	88%	90%	75-125%	



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(573) 244-8105

QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3275, L12-0001-3276

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.89	5	5/18/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	97.2	97%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	98.1	98%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3275

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	184	185	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.03	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.10	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.96	9.96-10.06	L11-0002-0103
CCV Buffer 10.00	9.98	9.96-10.06	L11-0002-0122
Slope	97.9%	90-102%	



Quentin J. Schmidt Analytical Laboratory
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(573) 244-8105

QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3275, L12-0001-3276

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/29/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec	Qual
Sulfate 12-3276	mg/l	11.9	6	18.2	105%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5	5.5	110%	85-115		



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(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
A	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.

NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	TLL

Report Acceptance	
QAO	Date
GWP	5/21/2012
Manager	Date
EJS	5/21/2012

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SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/21/12	12-3323	RM SEEP T	73	26950^	7.8	27	787	ND	16	196	1331	7.07
5/21/12	12-3323	RM SEEP D		26880^					50***			
5/21/12	12-3324	RMP ROUGH T	4.8	2959^	1.00	0.14 J	195	ND	790	251	1205	7.01
5/21/12	12-3324	RMP ROUGH D		3.0					726			

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



Quentin J. Schmidt Analytical Laboratory
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(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3323, L12-0001-3324

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.06	0.38	5/22/12	
Copper	ug/L	ND	0.97	5/22/12	
Lead	ug/L	ND	2.7	5/22/12	
Zinc	ug/L	ND	0.91	5/22/12	
Nickel	ug/L	ND	0.86	5/22/12	
Thallium	ug/L	ND	1.86	5/22/12	
Iron	ug/L	3.7	2.0	5/22/12	M

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3135, L12-0001-3136

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/22/12	
Iron	ug/L	0.69	2.0	5/22/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	1000	968	97%	85-125%	
Copper	ug/L	1000	1005	101%	85-125%	
Lead	ug/L	1000	982	98%	85-125%	
Zinc	ug/L	1000	960	96%	85-125%	
Nickel	ug/L	1000	976	98%	85-125%	
Iron	ug/L	1000	997	100%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	1000	996	100%	85-125%	
Iron	ug/L	1000	995	100%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3324 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	527	517	105%	103%	75-125%	
Copper	ug/L	0.41	500	500	489	487	98%	97%	75-125%	
Lead	ug/L	0.13	500	500	496	486	99%	97%	75-125%	
Zinc	ug/L	30	500	500	577	568	109%	108%	75-125%	
Nickel	ug/L	2.1	500	500	497	487	99%	97%	75-125%	
Iron	ug/L	14	500	500	473	470	92%	91%	75-125%	



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Viburnum, MO 65566
(573) 244-8105

QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3323, L12-0001-3324

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.89	5	5/25/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	96.2	96%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	99.1	99%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3324

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	251	246	98%	85-115%	

pH SM4500-H+F	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.96	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.05	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0122
Slope	97.8%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3323, L12-0001-3324

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/29/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec	Qual
Sulfate 12-3324	mg/l	12	5	17.8	116%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5	5.5	110%	85-115	



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(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.

NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/29/2012
Manager	Date
EJS	5/29/2012

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/23/12	12-3390	RM SEEP T	68	25990^	6.3	27	711	ND	3.9	185	1287	7.11
5/23/12	12-3390	RM SEEP D		25560^					3.6			
5/23/12	12-3391	RMP ROUGH T	5.3	2880^	0.92 J	ND	190	ND	738	233	1148	7.06
5/23/12	12-3391	RMP ROUGH D		1.3					656			

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3390, L12-0001-3391

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	5/24/12	
Copper	ug/L	1.1	0.97	5/24/12	M
Lead	ug/L	ND	2.7	5/24/12	
Zinc	ug/L	ND	0.91	5/24/12	
Nickel	ug/L	ND	0.86	5/24/12	
Thallium	ug/L	0.82	1.86	5/24/12	
Iron	ug/L	ND	2.0	5/24/12	

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3390, L12-0001-3391

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/24/12	
Iron	ug/L	ND	2.0	5/24/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	541	108%	85-125%	
Copper	ug/L	500	509	102%	85-125%	
Lead	ug/L	500	511	102%	85-125%	
Zinc	ug/L	500	565	113%	85-125%	
Nickel	ug/L	500	502	100%	85-125%	
Iron	ug/L	500	478	96%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	548	110%	85-125%	
Iron	ug/L	500	445	89%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3391 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	507	542	101%	108%	75-125%	
Copper	ug/L	0.55	500	500	484	512	97%	102%	75-125%	
Lead	ug/L	0.49	500	500	480	513	96%	103%	75-125%	
Zinc	ug/L	29	500	500	562	597	107%	114%	75-125%	
Nickel	ug/L	2.1	500	500	472	505	94%	101%	75-125%	
Iron	ug/L	5.3	500	500	453	492	90%	97%	75-125%	



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(573) 244-8105

QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3390, L12-0001-3391

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.89	5	5/25/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	96.2	96%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	99	99%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3390

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	185	186	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.96	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.05	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0122
Slope	97.8%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3390, L12-0001-3391

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qual
Sulfate	mg/l	ND	0.63	5/30/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec	Qual
Sulfate 12-3391	mg/l	11.5	5	17.6	122%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qual
Sulfate	mg/l	5	5.5	110%	85-115		



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Viburnum, MO 65566
(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	TLL

Report Acceptance	
QAO	Date
GWP	5/30/2012
Manager	Date
EJS	5/30/2012

THE DOE RUN COMPANY
SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/25/12	12-3439	RM SEEP T	73	28060^	6.0	28	802	ND	ND	196	1354	7.64
5/25/12	12-3439	RM SEEP D		29120****					ND			
5/25/12	12-3440	RMP ROUGH T	4.7	20550^	ND	ND	1021	2.8	1663	240	1199	7.32
5/25/12	12-3440	RMP ROUGH D		5.4					675			

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3439, L12-0001-3440

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.02	0.38	5/25/12	
Copper	ug/L	0.0007	0.97	5/25/12	
Lead	ug/L	ND	2.7	5/25/12	
Zinc	ug/L	0.43	0.91	5/25/12	
Nickel	ug/L	ND	0.86	5/25/12	
Thallium	ug/L	0.34	1.86	5/25/12	
Iron	ug/L	2.2	2.0	5/25/12	M

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3439, L12-0001-3440

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	0.27	0.91	5/25/12	
Iron	ug/L	ND	2.0	5/25/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	509	102%	85-125%	
Copper	ug/L	500	483	97%	85-125%	
Lead	ug/L	500	514	103%	85-125%	
Zinc	ug/L	500	513	103%	85-125%	
Nickel	ug/L	500	506	101%	85-125%	
Iron	ug/L	500	502	100%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	504	101%	85-125%	
Iron	ug/L	500	480	96%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3440 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	524	528	105%	106%	75-125%	
Copper	ug/L	0	500	500	453	469	91%	94%	75-125%	
Lead	ug/L	0	500	500	490	492	98%	98%	75-125%	
Zinc	ug/L	206	500	500	738	740	106%	107%	75-125%	
Nickel	ug/L	17	500	500	500	504	97%	97%	75-125%	
Iron	ug/L	17	500	500	462	481	89%	93%	75-125%	



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QUALITY CONTROL DATA
SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3439, L12-0001-3440

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.9	5	5/31/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	89.2	89%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	94.1	94%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3440

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	240	238	99%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.05	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.95	9.96-10.06	L11-0002-0103
CCV Buffer 10.01	10	9.96-10.06	L11-0002-0122

Slope 98.2% 90-102%



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3439, L12-0001-3440

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	5/31/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec	Qual
Sulfate 12-3439	mg/l	13.5	5	18.6	102%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5	5.5	110%	85-115		



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	
Manager	Date
EJS	

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Fe	Ca	Mg	Al	Si	Mn	SO4	Sulfide	Phosphate	Chloride	TOC	TSS	Alkalinity	Hardness
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
5/30/12	12-3485	RMP ByPass 3 T	6.2	40530^	0.21	3676	1706					NA	240	NA	NA	14.2	126	269.5	6013
5/30/12	12-3485	RMP ByPass 3 D	5.9	4.5	2.6***	662	425.7	132.4	0.004	5	211								

RL	2.7	0.91	0.97	2
MDL	0.85	0.28	0.3	0.34



Quentin J. Schmidt Analytical Laboratory
43 Iron County Road No 1 Bldg 3
Viburnum, MO 65566
(573) 244-8105

SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3485

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Copper	ug/L	2.1	0.97	6/1/12	M
Lead	ug/L	ND	2.7	6/1/12	
Zinc	ug/L	ND	0.91	6/1/12	
Manganese	ug/L	ND	NA	5/31/12	
Iron	ug/L	5.1	2.0	6/1/12	M

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Copper	ug/L	500	488	98%	85-125%	
Lead	ug/L	500	513	103%	85-125%	
Zinc	ug/L	500	512	102%	85-125%	
Manganese	ug/L	500	510	102%	85-125%	
Iron	ug/L	500	503	101%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3485 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Copper	ug/L	0	1000	1000	954	941	95%	94%	75-125%	
Lead	ug/L	0	1000	1000	857	847	86%	85%	75-125%	
Zinc	ug/L	405	1000	1000	1307	1284	90%	88%	75-125%	
Manganese	ug/L	199	500		644		89%		75-125%	
Iron	ug/L	37	1000	1000	917	921	88%	88%	75-125%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3485

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.9	5	5/31/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	89.2	89%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	100	94.1	94%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3485

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO ₃	269.5	269.5	100%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.05	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.95	9.96-10.06	L11-0002-0103
CCV Buffer 10.00	10	9.96-10.06	L11-0002-0122
Slope	98.2%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: RMP ByPass

ANALYSIS METHOD: SM 2540D

ANALYSIS DESCRIPTION: 2540D Total Suspended Solids

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3485

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solid	mg/L	0.2	5	5/15/2012	

LABORATORY CONTROL SAMPLE L12-0002-0034

Parameter	Units	Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solid	mg/L	5	6	120%	75-125	

LAB DUPLICATE

SAMPLE NUMBER / NAME: 12-3485

Parameter	Units	Results	Dup Results	% Rec	Limits	Qualifiers
Total Suspended Solid	mg/L	126	130	103%	75-125	

LABORATORY CONTROL SAMPLE L12-0002-0034

Parameter	Units	Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solid	mg/L	5	4	80%	75-125	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3485

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc.	Spike Conc.	MS Results	MSD Results	MS % Rec	MSD % Rec	Rec Limits	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115	

Sample disposed of before being assayed.



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QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	6/13/2012
Manager	Date
EJS	6/13/2012

THE DOE RUN COMPANY

SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	S04	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l
5/30/12	12-3483	RM SEEP T	74	29890^	11	27	822	3.3	7.4	196	1003	7.33
5/30/12	12-3483	RM SEEP D		29600^					2.9			
5/30/12	12-3484	RMP ROUGH T	4.2	2050^	2.0	ND	155	ND	689	259	1174	7.06
5/30/12	12-3484	RMP ROUGH D		16					667			

RL	2.7	0.91	0.97	0.38	0.86	1.4	2
MDL	0.85	0.28	0.3	0.12	0.27	0.58	0.34



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SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3483, L12-0001-3484

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	5/31/12	
Copper	ug/L	1.4	0.97	5/31/12	M
Lead	ug/L	0.10	2.7	5/31/12	
Zinc	ug/L	ND	0.91	5/31/12	
Nickel	ug/L	0.04	0.86	5/31/12	
Thallium	ug/L	0.93	1.86	5/31/12	
Iron	ug/L	9.8	2.0	5/31/12	M

METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-3483, L12-0001-3484

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	5/31/12	
Iron	ug/L	ND	2.0	5/31/12	

LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	510	102%	85-125%	
Copper	ug/L	500	488	98%	85-125%	
Lead	ug/L	500	513	103%	85-125%	
Zinc	ug/L	500	512	102%	85-125%	
Nickel	ug/L	500	512	102%	85-125%	
Iron	ug/L	500	503	101%	85-125%	

LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	516	103%	85-125%	
Iron	ug/L	500	512	102%	85-125%	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-3484 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0.04	500	500	568	560	114%	112%	75-125%	
Copper	ug/L	0.97	500	500	501	500	100%	100%	75-125%	
Lead	ug/L	3.2	500	500	534	526	106%	105%	75-125%	
Zinc	ug/L	21	500	500	616	609	119%	118%	75-125%	
Nickel	ug/L	1.9	500	500	529	521	105%	104%	75-125%	
Iron	ug/L	10	500	500	487	489	95%	96%	75-125%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-3483, L12-0001-3484

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.9	5	5/31/12	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	100	89.2	89%	85-115%	

LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	100	94.1	94%	85-115%	

LABORATORY SAMPLE DUPLICATE 12-3483

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	196	194	99%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0121
ICV Buffer 4.00	4.05	3.95-4.05	L11-0002-0120
ICV Buffer 10.01	9.95	9.96-10.06	L11-0002-0103
CCV Buffer 10.00	10	9.96-10.06	L11-0002-0122
Slope	98.2%	90-102%	



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QUALITY CONTROL DATA

SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-3483, L12-0001-3484

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l	ND	0.63	6/13/12	

MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MS Results	MS % Rec	% Rec Limits	Qual
Sulfate 12-3483	mg/l	10	10	18.4	84%	75-125	

LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	3	2.99	100%	85-115	



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QUALIFIERS

SEMO PROJECT

DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
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**	Unusable value, QA/QC criteria not met.
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ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.
M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R RPD value was outside control limits.
NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	TLL

Report Acceptance	
QAO	Date
GWP	6/19/2012
Manager	Date
EJS	6/19/2012